California 2030: An Efficient Future, Executive Summary, September 2005

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PACIFIC INSTITUTE

CALIFORNIA WATER 2030:
AN EFFICIENT FUTURE

A Report of the Pacific Institute, Oakland

Peter H. Gleick, Heather Cooley, David Groves

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ACKNOWLEDGEMENTS

In many ways, this report is a continuation of work the Pacific Institute has been pursuing for more than a decade. In 1995, the Institute published a vision of sustainable water use in California, entitled "California Water 2020." This report received an enormous amount of attention for proposing that there were affordable, attainable solutions to the state's perennial water disputes and challenges; in a lead editorial, the San Francisco Chronicle called it "a common sense plan" for the future. Yet traditional water planners are reluctant to explore alternative visions of the future. The most recent draft California Water Plan is a case in point—several scenarios were developed for the year 2030, yet none of them tried to evaluate what a truly water-efficient future could look like, instead pushing that analysis off to 2010. We believe such a future is possible, and even desirable. And we believe that thinking about what an efficient future might look like, and how to get there, are worthy and urgent goals.

Funding for this study has come from a variety of sources that believe the Pacific Institute should have the freedom to explore unusual water paths and that solutions to water problems are possible. We thank them, especially the Flora Family Foundation, the Charles Evan Hughes Memorial Fund, and the William and Flora Hewlett Foundation. Their generosity and foresight have given us the flexibility to respond when and where we think it most important and necessary.

We would also like to thank all those who have offered ideas, data, information, and comments on the report, including Nick Di Croce, Lloyd Fryer, Alex Hildebrand, Scott Matyac, Mindy McIntyre, Jonas Minton, Bob Wilkinson, numerous members of the California Water Plan Public Advisory Committee, DWR staff, and an anonymous reviewer. We would like to thank Gary Wolff for fruitful discussions about the economics of conservation and efficiency. We would also like to thank Nicholas Cain of the Institute and Joe Sadusky and Bryan Kring for their help in editing, formatting, and producing the report.

All errors are, of course, our own.

ABOUT THE PACIFIC INSTITUTE

The Pacific Institute is dedicated to protecting our natural world, encouraging sustainable development, and improving global security. Founded in 1987 and based in Oakland, California, we provide independent research and policy analysis on issues at the intersection of development, environment, and security. Our aim is to find real-world solutions to problems like water shortages, habitat destruction, global warming, and conflicts over resources. We conduct research, publish reports, recommend solutions, and work with decision makers, advocacy groups, and the public to change policy. More information about the Institute, staff, directors, funders, and programs can be found at www.pacinst.org and www.worldwater.org.

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David Groves is a doctoral student in Policy Analysis at the Pardee RAND Graduate School (Ph.D. expected in August 2005). His dissertation applies new quantitative methods for decision making under deep uncertainty to California long-term water planning. As part of this work, he developed in collaboration with California Department of Water Resources staff a model to quantify scenarios of future water demand. He also holds an M.S. in Atmospheric Sciences and Certificate in Environmental Management from the University of Washington and an M.S. and B.S. from Stanford University.

CONTENTS

EXECUTIVE SUMMARY

What could California's water situation look like in the year 2030—twenty-five years from now? The answer is, almost anything: from shortage and political conflict to sufficiency and cooperation. California water planners regularly prepare projections of supply and demand as part of the California Water Plan process, but these projections have never included a vision of a truly water-efficient future, where California's environmental, economic, and social water needs are met with smart technology, strong management, and appropriate rates and incentives. A water-efficient future is possible; indeed, it is preferable. We present a "High Efficiency" scenario here in which Californians maximize our ability to do the things we want, while minimizing the amount of water required to satisfy those desires.

Under a High Efficiency scenario, total human use of water in California could decline by as much as 20 percent while still satisfying a growing population, maintaining a healthy agricultural sector, and supporting a vibrant economy. Some of the water saved could be rededicated to agricultural production elsewhere in the state; support new urban and industrial activities and jobs; and restore California's stressed rivers, groundwater aquifers, and wetlands.

This High Efficiency scenario is not a *prediction* for the future, but a desirable and achievable *possibility*—a vision of California in which improvements in water-use efficiency are considered the primary tools for reducing human pressures on the state's precious water resources. Can such an efficient water future be achieved? Yes, given appropriate attention and effort, California's water-use practices can be substantially modified over the next quarter century, just as they have over the past 25 years. Will such a future be achieved? That is a question that only the public and our elected officials can answer. We hope this analysis will contribute to the dialogue on how to design and implement appropriate strategies for moving along this more efficient path.

Highlights

- A water-efficient future for California is possible.
- The Pacific Institute High Efficiency scenario shows that water use in 2030 could be 20 percent below 2000 levels, even with a growing population and a healthy economy.
- A water-efficient future is achievable, with no new inventions or serious hardships.
- Implementing serious efficiency improvements requires actions on the part of legislators, water managers, water districts and agencies, farmers, corporations, and all individuals.
- The sooner such actions are taken, the easier the transition to an efficient future will be.

Water use in 2030 could be 20 percent below 2000 levels —even with a growing population.

Water Scenarios

The State of California has routinely prepared water scenarios and projections as part of long-term water planning. The principal tool for water planning at the state level is the California Water Plan, a regular analysis published by the California Department of Water Resources (DWR).[1] The newest version of the Plan was released for public review in May 2005. Figure ES-1 shows projections of future human water demands from the California Water Plans over the past four decades, together with an estimate of actual water use. As this figure shows, official scenarios routinely project substantial increases in water use over time, often far in excess of the use that actually materializes.

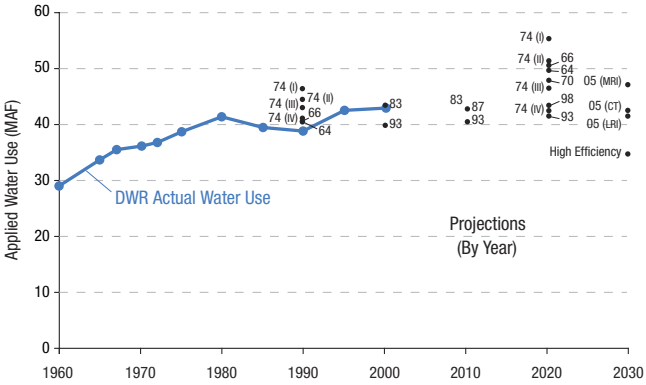


Figure ES-1
Projections of Total Water Demands in California

Each Water Plan Update makes one or more projections of future demand. The number next to each projection refers to the year in which the projection was made. The 1974 Water Plan Update evaluated four scenarios for future demand, represented by Roman numerals I-IV. The 2005 Water Plan Update evaluates three scenarios of future demand: Current Trends (CT), More Resource Intensive (MRI), and Less Resource Intensive (LRI).

1 The California Water Plan is also known as Bulletin 160.

The 2005 Draft California Water Plan introduced a long-term effort to develop multiple scenarios of water supply and demand. To initiate this effort, the 2005 Water Plan staff and Public Advisory Committee developed three scenarios of future water demand in California. The three scenarios developed for the 2005 version provide estimates of the quantity of water that would be used in 2030 under specified demographic, economic, agricultural, and water management conditions. Figure ES-2 and ES-3 show urban and agricultural water use for the three DWR scenarios for 2030, compared to current (year 2000) levels. The Department of Water Resources describes these scenarios as follows:

Current Trends. Water demand based on "current trends with no big surprises."

Less Resource Intensive. "California is more efficient in 2030 water use than today while growing its economy within much more environmentally protective policies."

More Resource Intensive. "California is highly productive in its economic sector. Its environment, while still important, is not the state's first priority for water management decisions. Water use in this scenario is less efficient in 2030 than it is in [the other] scenarios …" (DWR 2005).

A close analysis reveals that these scenarios are not radical, or even dramatic, departures from past analyses. All three DWR scenarios include only modest efficiency improvements achievable with current policies and programs. DWR has stated their intention to evaluate various "response packages," including greater water-use efficiency efforts, for the 2010 California Water Plan. We support that effort, but believe it is critical to begin evaluating, and implementing, stronger water-conservation and efficiency programs now. Waiting another five to ten years will make solving California's complex water challenges more difficult and expensive.

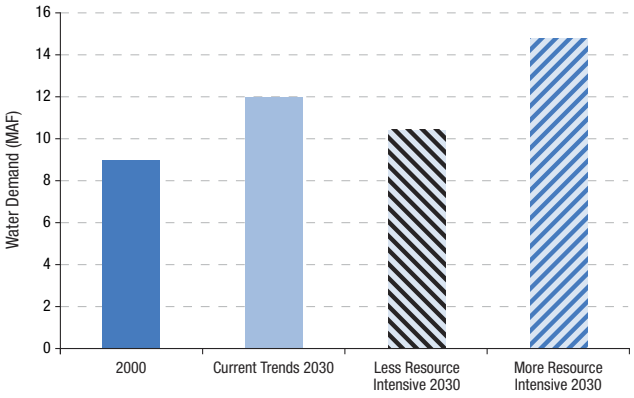
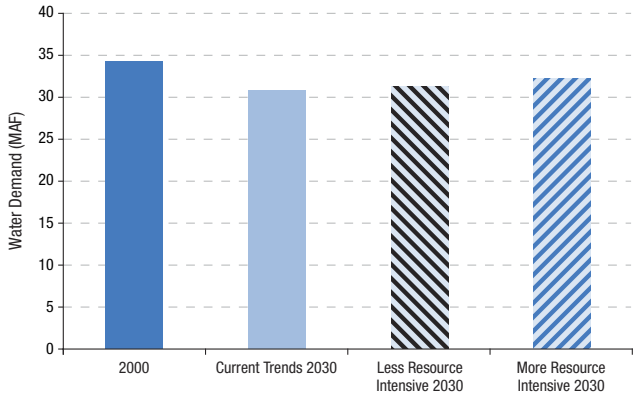


Figure ES-2
Urban Water Demand from DWR's Estimate for 2000 and for 2030 as Projected in the Three DWR Scenarios

Figure ES-3
Agricultural Water Demand from DWR's Estimate for 2000 and for 2030 as Projected in the Three DWR Scenarios



Even the most efficient DWR scenario shows increases in urban water use by 2030 of nearly 1.5 million acre-feet (MAF), and the most inefficient scenario projects urban demand to increase by a huge, and most likely unattainable, 5.8 MAF. All three scenarios project slight (5 to 10 percent) decreases in agricultural water use over the next 30 years, similar to the agricultural forecasts of the last three official California Water Plans.

We believe it is possible to foresee—and move toward—a different future. We envision a future in which California water use is highly efficient, permitting us to maintain a healthy economy and healthy ecosystems while reducing overall water use. In an attempt to describe this future, we present here an alternative, High Efficiency scenario.

Highlights of the Pacific Institute High Efficiency Scenario

A water-efficient future for California is possible.

According to our High Efficiency scenario, there is great potential for improving agricultural and urban water-use efficiency. The scenario was produced with the same model used by DWR to generate their three future demand scenarios for the 2005 California Water Plan. Our scenario adopted the same projections of population, housing distribution, agricultural land area, crop type and distribution, and income projections used by DWR. For the Pacific Institute High Efficiency scenario, we modified the assumptions about the potential for improving efficiency of water use based on more comprehensive implementation of existing technology and application of historical trends for water prices. Our analysis suggests that a water-efficient future is possible.

The Pacific Institute High Efficiency scenario shows that water use in 2030 could be 20 percent below 2000 levels, even with a growing population and a healthy economy.

The Pacific Institute High Efficiency scenario is based on widespread adoption of existing water-efficiency technologies, not on the invention of new efficiency options, and on different estimates of water prices and trends. Figures ES-4 and ES-5 show total human water demands generated by the DWR Current Trends and Pacific Institute High Efficiency scenarios between 2000 and 2030, along with estimated actual water use during the latter half of the 20th century. Overall statewide agricultural and urban water demand is projected to decline in both scenarios, but in the Pacific Institute High Efficiency scenario total human use of water declines by 8.5 MAF—a reduction of around 20 percent from 2000.

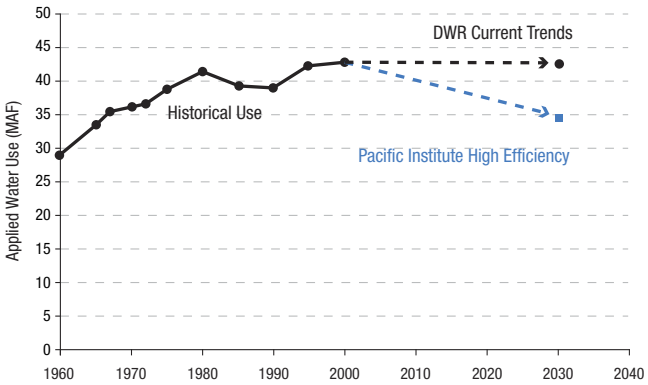


Figure ES-4
Statewide Trend in Total Urban and Agricultural Water Demand Between 1960 and 2000, with Projections to 2030 in the Current Trends and High Efficiency Scenarios

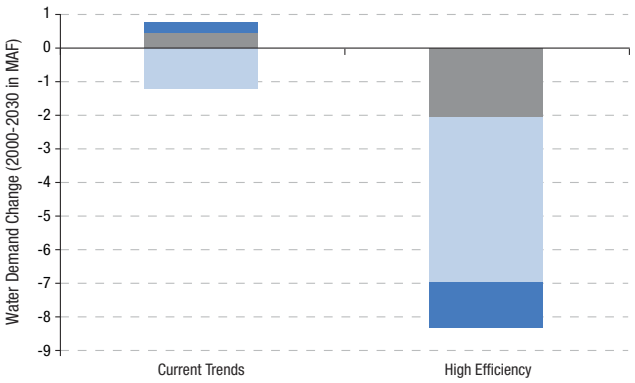


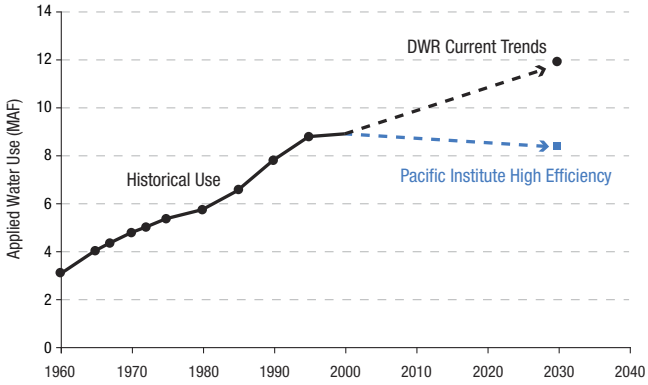
Figure ES-5
Urban and Agricultural Water Demand Change (2000-2030) by Geographic Region in the Current Trends and High Efficiency Scenarios

A water-efficient future is achievable, with no new inventions or serious hardships.

Urban water use in the Pacific Institute High Efficiency scenario falls 0.5 MAF per year below actual 2000 levels and far below the 2030 Current Trends scenario of DWR. Demand for water in California's urban sector between 2000 and 2030 is projected to increase by 3.0 MAF in the Current Trends scenario and decrease by 0.5 MAF in the Pacific Institute High Efficiency scenario (see Figure ES-6), a difference in urban water use of over 3.5 MAF annually.

Total agricultural water use declines more than 20 percent from actual year 2000 water use in the Pacific Institute High Efficiency scenario as farmers move to more efficient irrigation methods, without reducing crop area or changing crop type from the official state Current Trends scenario. Figure ES-7 shows actual and projected agricultural water demand between 1960 and 2030 for the Current Trends and High Efficiency scenarios. Agricultural water demand is projected to decline from 2000 by ten percent (3.5 MAF) and 23 percent (8 MAF) in these two scenarios, respectively, while overall crop production remains relatively unchanged. The difference between the scenarios—approximately 4.5 MAF in water savings—is due to assumptions about irrigation technology and agricultural water prices. Even though total water use is projected to drop substantially in our scenario, total income to farmers remains effectively unchanged and total value per acre in the High Efficiency scenario slightly increases.

Figure ES-6
Statewide Trend in Urban Water Demand Between 1960 and 2000, with Projections to 2030 in the Current Trends and High Efficiency Scenarios



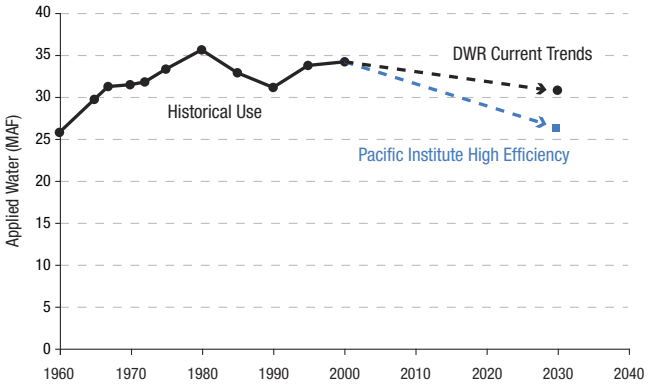


Figure ES-7
Statewide Trend in Agricultural Water Demand Between 1960 and 2000, with Projections to 2030 in the Current Trends and High Efficiency Scenarios

Reaching the Pacific Institute High Efficiency future is possible, but will require serious effort on the part of California policy makers, water managers, and the public.

We believe that this efficient future is achievable, with no new inventions or serious hardships. Indeed, we believe this future is likely to be better for all Californians and the environment. But implementing serious efficiency improvements requires actions on the part of legislators, water managers, water districts and agencies, farmers, corporations, and all individuals.

The sooner such actions are taken, the easier the transition to an efficient future will be.

Delaying action on water-conservation and efficiency increases the pressure to find, build, or buy new expensive and environmentally damaging sources of water supply. In California, and much of the rest of the western United States, such sources of supply are increasingly scarce or controversial. While we do not believe a highly efficient future is necessarily easy to achieve, we think it will be easier, faster, and cheaper than any other option facing us.

Actions to Be Taken Now

Pricing policies that subsidize the inefficient use of water should be eliminated.

- Ensure that urban and agricultural water rates reflect the true cost of service, including non-market costs.
- Phase out water subsidies on the Central Valley Project, especially for low-valued, water-intensive crops.
- Implement new rate structures that encourage efficient use of water.
- Avoid inappropriate subsidies for new water-supply options.

Efforts to promote the use of water-efficient technologies and practices should be greatly expanded, in both the urban and agricultural sectors.

- Set new water-efficiency standards for residential and commercial appliances, including toilets, washing machines, dishwashers, showers, and faucets.
- Offer comprehensive rebates, including both energy and water rebates, for the purchase of water-efficient appliances.
- Require water-efficient appliances to be "retrofit on resale" for existing homes.
- Revise and expand "Best Management Practices" for urban and agricultural water agencies.
- Make "Best Management Practices" mandatory and enforceable.
- Expand development and deployment of efficient irrigation technologies and new crop types.

Legislative, regulatory, and administrative support should be given to those water transfers that improve water-use efficiency, while promoting the overall well-being of rural communities.

- Implement programs to permit water saved through efficiency improvements to be transferred and marketed, but reduce adverse impacts on rural communities and the environment from such transfers.
- A statewide system of water data monitoring and exchange should be created, especially for water use.
- Collect and make publicly available comprehensive water-use data for all users.
- Design and implement comprehensive local groundwater monitoring and management programs statewide.

Educational programs on water use, and on the potential for water-use efficiency, should be expanded.

- Label all appliances with efficiency ratings.
- Expand water-efficiency information and evaluation programs in the Agricultural Extension Services and other agricultural outreach efforts.
- Develop on-line data collection and dissemination networks to provide farmers with immediate meteorological and hydrological information on climate, soil conditions, and crop water needs.

Better combined land and water planning is needed.

- Demonstrate a secure, permanent supply of water before new urban and suburban developments are approved.
- Demonstrate water-efficient housing designs before developments are approved.
- Protect high-quality agricultural land and related watersheds from urbanization.

Conclusions

The two scenarios described here—the DWR Current Trends and the Pacific Institute High Efficiency scenarios—offer different views of urban and agricultural water use in 2030. They are the result of making different assumptions about a range of water efficiency options, policies, technologies, and decisions. Neither scenario is a prediction. How much water will be needed and used to meet urban and agricultural demands in 2030 is unknowable and uncertain, because it depends on a vast array of factors. Some of these factors are partly or completely out of the hands of Californians, such as decisions about crop production in other countries, the extent and severity of climate changes, technological developments, national policies around efficiency standards or pricing of water from federal projects, and so on.

Other factors, however, are well within our ability to influence, and some of these factors will have a huge effect on future water demands. We believe a water-efficient future is possible; indeed we believe such a future is preferable. Ultimately, which future we reach depends upon what water policies are implemented over the coming years. Experience has shown that efforts to improve water-use efficiency are consistently successful and cost-effective. If California put as much time, money, and effort into water-efficiency programs as has gone into traditional water supply development, a high efficiency future could be readily achieved—with benefits to our economy, environment, and health.

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